Final Report

Annual Report (Year 8): Caroline Springs Railway Station Offset Site, Victoria

PREPARED FOR

VicTrack

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Ecology and Heritage Partners Pty Ltd

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GLOSSARY

Acronym	Description
AES	Aus Eco Solutions
CMP	Conservation Management Plan
DELWP	Victorian Department of Environment, Land, Water and Planning
DAWE	Commonwealth Department of Agriculture, Water and the Environment
EHP	Ecology and Heritage Partners
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
MNES	Matters of National Environmental Significance
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
PG	Plains Grassland
OMP	Offset Management Plan
SLL	Striped Legless Lizard *Delma impar*
SRF	Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*
VQA	Vegetation Quality Assessment

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EXECUTIVE SUMMARY

Ecology and Heritage Partners Pty Ltd were commissioned by VicTrack to undertake ecological monitoring and oversee land management works for the Caroline Springs Railway Station Offset Site, located at Christies Road, Caroline Springs (Figure 1). The objective was to provide a framework for the continuation of the management, auditing and reporting required to be undertaken as part of the approved CMP and OMP as per EPBC 2010/5463, to ensure the enhancement of the 2.04 hectare offset area, and other areas of retained grassland at the Caroline Springs Railway Station.

This report details the results of the Year 8 monitoring, including the status of three matters of National Environmental Significance (MNES), Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* (translocated and remnant plants) (SRF), Striped Legless Lizard *Delma impar* (SLL) and quality and extent of the threatened ecological community, *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP).

Native Vegetation

An assessment of the condition and extent of *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) was undertaken to observe any changes in the native vegetation cover and weed extent within the grassland.

Biomass across the offset site is very high, with vegetation condition ranging from moderate to high due to the overall low cover of high threat weeds and mixture of native herbs and grasses present. Three habitat zones of differing quality were recorded in the offset site and have remained relatively consistent with conditions recorded during the Year 8 monitoring period (Figure 2). All three habitat zones qualify as the EPBC Act listed ecological community, NTGVVP, due to the cover of non-grass weeds (<30% of total vegetation cover), and >50% perennial tussock cover of Kangaroo Grass, Wallaby-grass, and Spear Grass, as per the published listing advice for the community (Threatened Species Scientific Committee 2008).

Spiny Rice-flower

The Spiny Rice-flower population included 58 translocated individuals and a number of in-situ individuals located within the offset site. The translocated individuals were established during 2014-2017, translocated in three cohorts. Of the initial 58 individuals translocated, 14 plants remain alive (25%) in the current monitoring period. Twenty-two (22) SRF seedlings grown from previously collected seed from specimens within the offset site were collected from VicUni and planted within the offset site by AES on the 27 May 2022. All plants were planted, lightly mulched, guarded and tagged.

As the current survival numbers are below the threshold which triggers a contingency response to occur, as per the contingency measures detailed in the CMP (EHP 2014a), seed will be collected by AES from SRF within the offset site following the 2022 flowering season. SRF seeds will be cleaned and given to VicUni in 2022 for germination. Seedlings will then be planted into the offset site, as required.

The translocation of SRF in the offset site is considered successful when 50% of translocated SRF have survived for a period of 5 consecutive years, as per the CMP. The 2014 cohort has reached this target.

Striped Legless Lizard

A total of two SLL individuals were recorded within the study area during the Year 8 targeted surveys, however, these individuals were not able to be captured. Eastern Blue-tongue *Tiliqua scincoides*, Tiger Snake *Notechis scutatus* and Little Whip Snake *Suta flagellum* were also recorded in the study area during tile grid checks. No other vertebrate fauna species of note were recorded during targeted surveys. The number of SLL recorded in Year 8 was attributed to the presence of a predator species (Tiger Snake), prolonged water inundation, and reduced habitat suitability.

Monitoring indicated that the quality of SLL habitat in the offset site has declined slightly during the Year 8 monitoring season compared to the past Year 6 and 7 levels, triggering responses for three management actions, including:

- Introduced grass cover >20%;
- Exposed rock <5%; and,
- Inter-tussock spacing <10%.

Conclusion and Recommendations

Year 8 monitoring indicated that the overall quality of native vegetation (outside areas subject to water inundation) is improving, however ongoing management and monitoring is required to ensure that the offset site maintains optimal habitats for significant species, such as SRF and SLL. To ensure that the native vegetation and habitat for significant species continues to improve, the following works should be incorporated into Year 9 land management and monitoring:

- Undertake an ecological burn in the middle section (PG2) of the offset site to improve habitat suitability for SLL, control weeds, and improve the quality and extent of native vegetation;
- Monitor the recovery of native vegetation in the eastern section of the offset site (i.e. in areas subject to water inundation). Undertake additional planting/seed broadcasting, if required;
- Monitor Vline drains and associated infrastructure to ensure prolonged water pooling does not occur in Year 9;
- Collect and germinate SRF seed (2022), and plant seedlings into offset site in mid-2023 (pending seedling growth and suitability for translocation);
- Continue to monitor and manage (i.e. water and hand weed) translocated and remnant SRF;
- Undertake targeted weed control to meet the targets outlined in the OMP (see Table 5);
- Continue to monitor rabbit proof fences for breaches and damage, including fallen/removed offset signage; and,
- Undertake rabbit control, if required.

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd were commissioned by VicTrack to undertake ecological monitoring and oversee land management works for the Caroline Springs Railway Station Offset Site, located at Christies Road, Caroline Springs (Figure 1). The objective was to provide a framework for the continuation of the management, auditing and reporting required to be undertaken as part of the approved CMP and OMP as per EPBC 2010/5463, to ensure the enhancement of the 2.04 hectare offset area, and other areas of retained grassland at the Caroline Springs Railway Station.

The offset site includes 2.04 hectares of native vegetation, comprising 1.92 hectares of Plains Grassland (PG) and *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP), and 0.12 hectares of exotic vegetation, and approximately 80 Spiny Rice-flower (SRF) individuals and suitable habitat for a confirmed population of Striped Legless Lizard (SLL).

The management, monitoring and auditing works required to be undertaken at Caroline Springs are detailed in the CMP (EHP 2014a) and OMP (EHP 2014b) prepared for the site, and approved by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) (formally the Department of Environment and Energy – DoEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC 2010/5463), and the Victorian Department of Environment, Land, Water and Planning (DELWP) (formerly the Department of Environment and Primary Industries – DEPI).

Specifically, the land management works relate to the protection and ecological monitoring of the quality of the EPBC Act-listed community NTGVVP, weed and pest control works, biomass control methods such as prescribed ecological burns, and management and monitoring of the existing populations of the EPBC Act-listed SRF and SLL. Aus Eco Solutions were engaged directly by VicTrack to undertake land management works in Year 8.

The Year 8 annual monitoring report presented below outlines the management and monitoring actions undertaken within the offset site between 1 July 2021 and 30 June 2022 (Figure 2). The monitoring results for Year 1–Year 7 is detailed in EHP 2015; 2016; 2017; 2018a; 2018b; 2019a; 2020; 2021.

This report outlines the results of the Year 8 ecological monitoring and addresses the management, in accordance with the CMP (EHP 2014a) and OMP (EHP 2014b), as per the EPBC Approval (EPBC 2015/5463). Additionally, EHP review the results of the Year 8 monitoring to determine if the targets are being met/will be met by Year 10.

1.2 Objectives

The overall objective is to protect and improve the quality and extent of native vegetation and significant ecological values present within the offset site, and in accordance with EPBC 2010/5463 and associated CMP and OMP. This includes the populations of nationally significant species listed under the EPBC Act, SRF and SLL, as well as the threatened ecological community, NTGVVP.

The objectives of the CMP are to:

- *Clearly identify the matters of national environmental significance that will be impacted by the proposed railway station;*

- *Prescribe measures to manage retained matters of national environmental significance, which are not to be affected by the proposed railway station development;*
- *Prescribe salvage and translocation procedures for the Spiny Rice-flower that are located within the development footprint, and salvage and removal protocols for any Striped Legless Lizard that are salvaged during pre-construction and construction activities;*
- *Prescribe management measures for the recipient site to allow the long-term survival of the existing and relocated Spiny Rice-flower plants and a Striped Legless Lizard population;*
- *Provide a management program for 10 years to monitor and undertake activities designed to improve the condition of the recipient site, manage key threats to the Spiny Rice-flower and Striped Legless Lizard, and prescribe corrective and contingency measures should the condition of the recipient site deteriorate;*
- *Provide a Plan that meets regulatory approvals with the Department of Environment and Primary Industries (DEPI) and the Department of the Environment (DoE); and,*
- *Ensure that the appropriate arrangements are in place for the sites to be managed in perpetuity so that the management gains achieved over the 10-year management period are maintained at their Year 10 levels in perpetuity* (EHP 2014a).

The objectives of the OMP are to:

- *Comply with Condition 2 of the Environment Protection and Biodiversity Conservation Act 1998 Referral Approval (2010/5463);*
- *Clearly state the offset targets generated through the proposed vegetation removal associated with the construction of the railway station;*
- *Determine a suitable offset location;*
- *Prescribe recommendations to achieve the offset targets through the management of remnant vegetation over a 10-year period; and,*
- *Ensure that the appropriate arrangements are in place for the Offset site to be managed in perpetuity so that the management gains achieved over the 10-year management period are maintained in an ongoing manner* (EHP 2014b).

1.3 Offset Site Security

Condition 1 of the EPBC Act approval specifies that the land identified in Annexure 1 of approval 2010/5463 (i.e. the protected site), adjacent to the clearing site must be protected in perpetuity to compensate for impacts to the nationally significant ecological community NTGVVP, and EPBC Act listed species, SRF and SLL, in the form of a conservation covenant under the *Victorian Conservation Trust Act 1972*. A Trust for Nature (TfN) conservation covenant was entered by the Public Transport Development Authority and TfN and approved by the Minister on 27 June 2014.

2 MONITORING METHODS

Baseline data to determine the condition and extent of Plains Grassland (PG) and NTGVVP, as well as the current population status of SLL and SRF within the offset site was undertaken by EHP in 2009 and 2010, respectively (EHP 2009; EHP 2010). The data collected during the biodiversity assessment and subsequent targeted surveys was used to inform the CMP/OMP (EHP 2014a, 2014b). Ecological monitoring is undertaken annually until the quality conditions outlined within the CMP/OMP are met.

Ecological monitoring in Year 8 was undertaken to monitor the quality and extent of PG and NTGVVP, as well as the population status of SLL and the retained and translocated SRF populations within the offset site. The following section outlines the methods used to undertake the monitoring in Year 8, in accordance with the CMP/OMP (EHP 2014a, 2014b).

2.1 Native Vegetation Monitoring

The following methods have been undertaken in accordance with the CMP (EHP 2019) and associated federal policy documents, *Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland* (Commonwealth of Australia 2011a) and *Commonwealth Listing Advice on Natural Temperate Grassland of the Victorian Volcanic Plain* (Threatened Species Scientific Committee 2008):

- To assess changes in quality and extent of PG and NTGVVP, the following monitoring was undertaken:
    - The extent of PG and NTGVVP was mapped and a Habitat Hectare assessment (as per the *Vegetation Quality Assessment Manual: Guidelines for applying the habitat hectares scoring method* (DSE 2004) was undertaken to determine the overall quality (i.e. condition); and,
    - Photo point (Figure 5) monitoring was undertaken at photo points established in Year 1, which were placed in areas of native vegetation and predominantly weeds:
- An assessment of suitable habitat (i.e. extent, quality and structure) for SLL and SRF was undertaken to determine the effectiveness of management for the existing populations;
- Weed Monitoring to determine the effectiveness of management:
    - Broad weed mapping to record the overall cover, extent and composition (i.e. herbaceous, grassy, woody) of weeds within the offset site; and,
    - The cover and extent of all high threat weeds, as per the CMP/OMP, was mapped and recorded.

2.1.1. Supplementary Plantings

Approximately eight species of herbs (436 individuals) were planted in August 2017 to increase floristic diversity within the offset site. Additional herbs were planted in September 2018 and May 2022 (Table 1) (Figure 2). If plant survivorship drops below 80%, supplementary planting will be required.

Table 1. Native seedlings planted within the Offset Site (May 2022).

Scientific Name	Common Name	No. of Seedlings Planted
Dianella revoluta var. *revoluta* (syn *Dianella admixta*)	Black-anther flax lily	370
Senecio quadridentatus	Cottony Fireweed	60
Calocephalus citreus	Lemon Beauty-heads	220

2.2 Spiny Rice-flower Monitoring

The following methods have been undertaken in accordance with the CMP/OMP (EHP 2014a, 2014b), PSRT protocols (PSRT 2013) and the monitoring protocol outlined within Vallee *et al*. (2004):

- Undertake biannual monitoring (2021 and 2022) of translocated SRF plants during flowering period (May-August). The following attributes are collected as part of the translocation monitoring:
    - Growth, sex, virility (percentage of plant in flower), recruitment, health and survival rates (in accordance with Table 2).
- 25 existing in-situ plants (remnant plants) within the offset site were monitored concurrently to compare the growth, survival and recruitment of translocated SRF;
- To mitigate the threat of drought stress, particularly between January – April 2021, translocated SRF were watered monthly in accordance with the regime summarised in Table 3;
- Biomass surrounding translocated SRF plants was monitored to ensure appropriate inter-tussock space is maintained and does not prevent plant growth; and,
- Tags were checked and replaced by AES during 2022 planting events (numbers and plant locations provided by EHP).

Table 2. Health Rating Metric for Spiny Rice-flower.

Health Rating	Description	Health Indicator
1	Excellent	Less than 5% dieback
2	Good	Between 15 < 30% dieback
3	Moderate	Between 30 < 75% dieback
4	Poor	Between 75 < 99% dieback
5	Dead	No evidence of live biomass

Table 3. Watering requirements for translocated SRF plants.

Months after planting	Period between significant rainfall events that will trigger watering	Watering Required
0-3	1 week	Weekly
3-9	3-4 weeks	Fortnightly
9 - 21	1 – 2 Months	Monthly

2.3 Striped Legless Lizard Monitoring

The following methods have been undertaken in accordance with the CMP/OMP (EHP 2014 and 2014b) and the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act* (Commonwealth of Australia 2011b):

- 2 tile grids (10 x 5 tiles per grid) were established in August 2014 (Figure 3);
- Tiles were established in areas of suitable habitat (i.e. tussock grassland or grassy habitat) at least three months before the survey period to allow 'bedding-in';
- Tiles were checked a minimum of eight times between September and December under suitable conditions (early morning on warm, still days);
- Time of survey, weather conditions and the ambient temperature will be recorded for each grid;
- Morphological data including sex, body size and reproductive condition will be recorded for all individuals captured, as well as dorsal head shots for unique identification purposes; and,
- Habitat monitoring to determine the suitability/condition of SLL habitat (Table 4) and required management.

Striped Legless Lizard monitoring will be undertaken annually, as per the OMP (EHP 2014b).

Table 4. Striped Legless Lizard habitat monitoring criteria.

Habitat variable	Ideal level^	Trigger Threshold	Trigger Response
Native clumping grass cover	50%	<30%	Plant native clumping species
Introduced grass cover	<10%	>20%	Remove weeds
Bare ground	20%	<5%	Removal of vegetation
		>50%	Plant native clumping species
Exposed rock	10%	<5%	Removal of vegetation
Inter-tussock spacing	30 centimetres	<10 cm	Removal of vegetation
		>50 cm	Plant native clumping species

Note: ^The ideal level value is the average value for each tile grid.

3 MONITORING RESULTS

3.1 Native Vegetation Monitoring

Vegetation monitoring was undertaken by a suitably qualified Ecologist on the 7 December 2021 and 17 March 2022. The overall condition of the Offset Site was regularly monitored throughout Year 8.

Biomass across the offset site is very high, with vegetation condition ranging from moderate to high due to the overall low cover of high threat weeds and mixture of native herbs and grasses present. Three habitat zones of differing quality were recorded in the offset site and have remained relatively consistent with conditions recorded during the Year 8 monitoring period (Figure 2). All three habitat zones qualify as the EPBC Act listed ecological community, NTGVVP, due to the cover of non-grass weeds (<30% of total vegetation cover), and >50% perennial tussock cover of Kangaroo Grass, Wallaby-grass, and Spear Grass, as per the published listing advice for the community (Threatened Species Scientific Committee 2008) (Figure 2). The habitat zones are specified below:

Plains Grassland 1 (PG1)

PG1 includes the eastern half of the offset-site (Figure 2) and is dominated by Kangaroo Grass *Themeda triandra*, Spear Grass *Austrostipa* spp., Weeping Grass *Microlaena stipoides* var. *stipoides*, Hairy Panic *Panicum effusum*, Swamp Wallaby-grass *Amphibromus* spp. (Plate 1). There are scattered graminoids and herbs throughout this area, including the nationally significant Spiny Rice-flower, Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis* (Plate 2), Cotton Fireweed *Senecio quadridentatus*, Berry Saltbush *Atriplex semibaccata*, Common Woodruff *Asperula conferta,* Pale Flax-lily *Dianella longifolia*, and native Rush *Juncus* spp., however, cover is low and native grasses are the dominant lifeform. Weed cover throughout this zone is low-moderate (<15%) and is largely restricted to the boundaries and the low-lying area on the north-eastern corner. The dominant weeds include Slender Pigeon-grass *Setaria parviflora*, Oats *Avena* spp., Brome *Bromus* spp., Couch *Cynodon dactylon* var. *dactylon* and Galenia *Aizoon pubescens*.

Plate 1. PG1 dominated by Kangaroo Grass; looking north from the southern boundary (Ecology and Heritage Partners 17/03/2022).

Plate 2. Slender Bindweed amongst native grasses (Ecology and Heritage Partners 17/03/2022).

Plains Grassland 2 (PG2)

PG2 includes the middle section of the offset site and incorporates the majority of embedded rock within the offset site (Figure 2). This zone is dominated by Spear Grass, with Kangaroo Grass, Weeping Grass, Wallaby Grass *Rytidosperma* spp., Windmill Grass *Chloris truncata* and the State-significant Rye Beetle-grass *Tripogon loliiformis* intermixed (Plate 3; Plate 4). Herbs are common throughout this area as embedded rock provides some refuge from the high cover of native grasses. Common herbs include those listed above in PG1, as well as Willow Herb *Epilobium billardiereanum*, Curved Rice-flower *Pimelea curviflora*, Common Everlasting *Chrysocephalum apiculatum*, and Lemon Beauty-heads *Calocephalus citreus* (Plate 5; Plate 6). Weed cover is low within this zone (<10%), with the majority of weeds restricted to the boundaries. High threat grass and herbaceous weeds occur throughout and include Patterson's Curse *Echium plantagineum*, Artichoke Thistle *Cynara cardunculus* subsp. *flavescens*, Ribwort *Plantago* spp., Galenia, Oats, Serrated Tussock *Nassella trichotoma*, Brome, Slender Pigeon-grass and Toowoomba Canary-grass *Phalaris aquatica*.

Plate 3. PG2 dominated by Spear Grass and Weeping Grass; looking south-east from the north-western boundary (Ecology and Heritage Partners 7/12/2021).

Plate 4. PG2 dominated Kangaroo Grass; looking west from the southern boundary (Ecology and Heritage Partners 17/03/2021).

Plate 5. Curved Rice-flower intermixed with Kangaroo Grass (Ecology and Heritage Partners 7/12/2021).

Plate 6. Herbs intermixed with native and exotic grasses (Ecology and Heritage Partners 7/12/2021)

Plains Grassland 3 (PG3)

PG3 includes the western corner of the offset site (Figure 2). PG3 is less diverse than PG1 and PG2 and is primarily dominated by Kangaroo Grass and Spiny Rice-flower. The habitat zone adjoins a small patch of Plains Grassy Wetland (PGWe1 on Figure 2), and the area was therefore occupied by native species often found in locations prone to inundation or those with heavier soils, such as Brown-back Wallaby-grass *Rytidosperma duttonianum* and Lesser Loosestrife *Lythrum hyssopifolia* (Plate 7; Plate 8). Weed cover was high (30-50%) in PG3, and the dominant species included Toowoomba Canary-grass *Phalaris aquatica*, Cocksfoot *Dactylis glomerata*, Chilean Needle-grass *Nassella neesiana*, Serrated Tussock, Oats, Slender Pigeon-grass, Panic Veldt-grass *Ehrharta erecta*, Ribwort, Artichoke Thistle, Galenia, and Cat's-ear *Hypochaeris* spp.

Plate 7. PG3 in the western corner of the Offset Site; looking west (Ecology and Heritage Partners 17/03/2022)

Plate 8. PG3 following brush cutting to remove biomass and prevent seed set of weedy grasses; looking west (Ecology and Heritage Partners 17/03/2022).

Plains Grassy Wetland 1 (PGWe1)

A small patch of PGWe was recorded in the western corner of the offset site (PGWe1 on Figure 2). This patch occupied a natural depression between the existing rock pile and PG3. Seasonal changes have resulted in floristic variation that may be associated with both PG and PGWe, and common species found in both EVCs were present, including Brown-back Wallaby-grass, Lesser Loosestrife, Common Blown-grass *Lachnagrostis filiformis*, and Rigid Panic *Walwhalleya proluta*. During the site assessment undertaken in Spring and Autumn, the dominant species was Common Spike-rush *Eleocharis acuta*, however it is expected that this area may be considered PG at various times of the year (i.e. summer) (Plate 9; Plate 10).

Plate 9. PGWe1 dominated by Common Spike-rush, Brown-back Wallaby-grass and Common Blown-grass (Ecology and Heritage Partners 07/12/2021).

Plate 10. PGWe1 adjoining PG3 in the western section of the Offset Site (Ecology and Heritage Partners 07/12/2021).

3.1.1. Supplementary Plantings

Supplementary plantings from previous management years have continued to survive and spread. Aus Eco Solutions undertook hand weeding and brush cutting to reduce the overall cover of biomass from around 2017 and 2018 plantings (Plate 11). Additional seedlings were planted within the offset site in May 2022 (see Section 2.1.1. for species list) (Herb plantings on Figure 2). Seedlings were planted in the area adjacent to previously planted herbs (Plate 12) and were planted following the ecological burn to ensure biomass was low and improve establishment and ongoing survivorship. Aus Eco Solutions will continue to hand weed and brush cut around supplementary plantings. Additional watering may be provided by AES, if required.

Plate 11. Healthy supplementary plantings from 2017; recently weeded by AES (Ecology and Heritage Partners 17/12/2021).

Plate 12. Supplementary plantings recently planted in burnt area; looking north-west from the northern boundary (Ecology and Heritage Partners 17/03/2022).

3.1.2. Introduced Vegetation

Overall weed cover throughout the offset site is generally low-moderate (<20%). Woody weeds have been effectively eliminated from the offset site, although follow-up work is regularly undertaken to remove any germinants or re-sprouting mature plants. Weedy grasses and herbaceous weeds continue to persist within

the site and remain the target for weed management in Year 8 and subsequent years. The dominant weeds recorded within the offset site are Patterson's Curse *Echium plantagineum*, Galenia *Aizoon pubescens*, Artichoke Thistle, Spear Thistle *Cirsium vulgare*, Ox-tongue *Helminthotheca echioides*, Ribwort *Plantago* spp., Oats, Toowoomba Canary-grass, Slender Pigeon-grass (Plate 13 – Plate 16).

Plate 13. Artichoke Thistle and Cat's Ear *Hypochaeris* spp., within the western corner of the offset site (PG3 on Figure 2) (Ecology and Heritage Partners 7/12/2021).

Plate 14. Galenia intermixed with weedy grasses in PG2 (Ecology and Heritage Partners 7/12/2021).

Plate 15. Patterson's Curse flowering within the offset site (Ecology and Heritage Partners 7/12/2021).

Plate 16. Oats dominating PG2; looing south from the northern boundary (Ecology and Heritage Partners 7/12/2021).

In Year 8, spot spraying of high threat grassy and herbaceous weeds was undertaken, as well as brush cutting to prevent seed set (Plate 17 – Plate 20). The cover of each weed recorded within the offset site is presented in Table 5.

Plate 17. Slender Pidgeon-grass senescing following spot spraying; looking north from the north-eastern corner (Ecology and Heritage Partners 17/03/2022).

Plate 18. Dead Serrated Tussock that has been spot sprayed and/or manually removed (Ecology and Heritage Partners 17/03/2022).

Plate 19. Weedy grasses senescing following spot spraying; looking north-east from the south-eastern corner (Ecology and Heritage Partners 17/03/2022).

Plate 20. Toowoomba canary-grass brush cut within PG3; looking west from the western corner (Ecology and Heritage Partners 17/03/2022).

Table 5. Weed cover for all weeds within the offset site.

Common Name	Scientific Name	Control Method	Timing for control	OMP target (%)	CaLP Act/WONS Status	High threat (Y/N)	Current cover %	Notes
WOODY WEEDS								
African Box-thorn	*Lycium ferocissimum*	Cut + Paint, remove debris from site	September - April	Eliminate (<1%)	W, N	Y	0%	Continue to remove seedlings/ re-sprouting mature plants
Sweet Briar	*Rosa rubiginosa*	Spot Spray/Cut + Paint	September - April	Eliminate (<1%)	N	Y	0%	Continue to remove seedlings/ re-sprouting mature plants
HERBACEOUS WEEDS								
Galenia	*Aizoon pubescens*	Spot Spray	September - April	Eliminate (<1%)	N	Y	<5%	Eliminate mature plants and new individuals as required.
Cape Weed	*Arctotheca calendula*	Spot Spray	Early Spring	Eliminate (<1%)	-	Y	<1%	Eliminate new individuals as required
Spear Thistle and other thistles	*Cirsium vulgare/ Helminthotheca echioides*	Spot Spray	All Year	Eliminate (<1%)	N	Y	<1%	Eliminate new individuals as required
Patterson's Curse	*Echium plantagineum*	Spot Spray	Early Spring	Eliminate (<1%)	N	Y	2%	Scattered germinants recruiting after spring rainfall

Common Name	Scientific Name	Control Method	Timing for control	OMP target (%)	CaLP Act/WONS Status	High threat (Y/N)	Current cover %	Notes
Flat Weeds and Mustards	*Hypochoeris* spp., *Plantago* spp., Brassica spp. etc	Spot Spray	All Year	Maintain low cover (<5%)	-	Y	5%	Continuing issue within the western corner of the offset site. Targeted management required to reduce cover
Soursob and other invasive *Oxalis* spp.	*Oxalis pes-caprae*	Spot Spray/ hand removal (dig bulb out) if there are small numbers	Late Winter at bulb exhaustion/ prior to seed set	Eliminate (<1%)	N	N	<1%	Eliminate new individuals as required
GRASSY WEEDS								
Chilean Needle Grass	*Nassella neesiana*	Spot Spray and remove/destroy inflorescence (where necessary)	Before seed set in late spring, remove seed heads if fertile	Eliminate (<1%)	W	Y	<5%	Eliminate new individuals as required
Serrated Tussock	*Nassella trichotoma*	Spot Spray	Before seed set in late spring	Eliminate (<1%)	W, N	Y	7%	Eliminate new individuals as required
Brown-top Bent	*Agrostis capillaris*	Spot Spray/Burn	October – January	Maintain low cover (<5%)	-	Y	5%	Eliminate new individuals as required
Annual Grasses	*Vulpia* spp. and *Avena* spp.	Spot Spray/Burn	July - November	Maintain low cover (<5%)	-	Y	15%	Undertake Autumn burn and undertake follow up control
Cocksfoot	*Dactylis glomerata*	Spot Spray	October – January	Eliminate (<1%)	-	Y	<5%	Undertake Autumn burn and undertake follow up control

Common Name	Scientific Name	Control Method	Timing for control	OMP target (%)	CaLP Act/WONS Status	High threat (Y/N)	Current cover %	Notes
Toowoomba Canary-grass	*Phalaris aquatica*	Spot Spray	October – January	Eliminate (<1%)	-	Y	5%	Undertake Autumn burn and undertake follow up control
Caterpillar Grass	*Paspalum dilatatum*	Spot Spray	October – January	Eliminate (<1%)	-	N	<1%	Undertake Autumn burn and undertake follow up control
Couch Grass/Kikuyu	*Cynodon dactylon/ Pennisetum clandestinum*	Spot Spray	November- March	Eliminate (<1%)	-	Y	<1%	Undertake Autumn burn and undertake follow up control
Panic Veldt Grass + Sweet Vernal Grass	*Ehrharta erecta* + *Anthoxanthum odoratum*	Spot Spray	All Year	Eliminate (<1%)	-	Y	5%	Undertake Autumn burn and undertake follow up control

3.1.3. Temporary Disturbance

A site meeting within the Caroline Springs Offset Site was held on the 16 November 2021, with representatives from AES, VicTrack, TfN, and EHP. AES highlighted a drainage issue that consequently created a temporary disturbance to the western section of the offset site (Figure 2) (Plate 21; Plate 22). It was later determined that a V/Line surface drain (trackside) on the southern boundary of the offset site was blocked from debris and sediment, and water was subsequently pooling within the offset site (Plate 23; Plate 24).

It should also be noted that Australia is experiencing a La Nina event, meaning that higher than average rainfall has occurred during Year 8, which may be a contributing factor.

Plate 21. Water pooling within the offset site (Ecology and Heritage Partners 16/11/2021).

Plate 22. PG1 affected by the prolonged water inundation; looking west from the eastern boundary (Ecology and Heritage Partners 16/11/2021).

Plate 23. V/Line drain opposite the offset site fence line (southern boundary) (Ecology and Heritage Partners 16/11/2021).

Plate 24. AES, TfN and VicTrack representatives inspecting the drain and impacts to the offset site (Ecology and Heritage Partners 16/11/2021).

To rectify the issue, V/Line cleaned the cess drain and pit further along the platform (west of the cess drain). In addition, V/Line are planning to drill several core holes in the retaining wall adjacent to the boundary of the offset site to prevent water pooling between the wall and offset site boundary. This is considered sufficient to prevent further flooding; however, monitoring will continue to be undertaken to prevent the issue occurring during high rainfall events.

Since the flooding event, Aus Eco Solutions have regularly (approximately twice per month) attended site and have continued to monitor the water pooling and grassland recovery; feedback throughout the months

following the on-site meeting indicated that the grassland is recovering, with native grasses re-sprouting. Additionally, a follow-up site assessment was undertaken by a Botanist from EHP on the 17 March 2022. The assessment determined that the site was recovering, with native grasses (predominantly Kangaroo Grass) re-sprouting from the base and larger tussocks regreening and flowering (Plate 25 – Plate 28).

To promote re-growth in low-lying areas that were more severely affected by water pooling (Figure 2), an ecological burn was undertaken (see Section 3.1.4). The contingency measures implemented by V/Line and the ecological burn are expected to be sufficient to prevent water pooling events in the future and promote grassland recovery, however, supplementary planting and native seed broadcasting will be undertaken if required.

Plate 25. Grassland recovery within the south-east corner of the offset site (Ecology and Heritage Partners 17/03/2022).

Plate 26. Kangaroo Grass actively regreening following drying of the offset site; looking west from the south-eastern corner (Ecology and Heritage Partners 17/03/2022).

Plate 27. Native grasses establishing (Ecology and Heritage Partners 17/03/2022).

Plate 28. Grassland recovery along the eastern boundary (Ecology and Heritage Partners 17/03/2022).

3.1.4. Ecological Burn

Aus Eco Solutions undertook an ecological burn on the 10 May 2022 (Figure 2). The Ecological Burn reduced the overall cover of biomass within the eastern section of the reserve and was also intended to promote regrowth of native grasses and SRF plants negatively impacted by water pooling (Plate 29 – Plate 32). An ecological burn is planned for Year 9 in the western section of the offset site.

Plate 29. Post ecological burn; looking south towards the western boundary of burn area (Ecology and Heritage Partners 19/05/2022).

Plate 30. Native vegetation re-sprouting following the ecological burn; looking south (Ecology and Heritage Partners 19/05/2022).

Plate 31. Post ecological burn; looking west from the offset site gate (Ecology and Heritage Partners 19/05/2022).

Plate 32. SLL tile grid in ecological burn area; looking north-west towards the industrial estate (Ecology and Heritage Partners 19/05/2022).

3.2 Spiny Rice-flower Monitoring

Spiny Rice-flower monitoring was undertaken by a suitably qualified Ecologist on the 7 December 2021. The SRF monitoring normally undertaken in May was not completed prior to the preparation of this annual report, due to the ecological burn undertaken in May (Figure 2). The results of the post-fire SRF monitoring assessment will be incorporated into the Year 9 annual report.

The SRF monitoring in Year 8 determined that the majority of translocated SRF have either perished or are in a dormant state (i.e. below ground taproot is alive). Of the 58 plants translocated into the offset site since 2014, only 14 plants remain alive (25%). This includes 5 plants from the 2014 cohort, 9 plants from the 2015 cohort, and 0 plants from the 2017 cohort. Translocated plants recorded as alive are in poor – good health. No plants were flowering and no germinants were recorded during the December monitoring period, however, many had good foliage cover; 12/14 plants had ≥50% foliage cover at the time of the assessment (Appendix 2; Appendix 3).

Table 6. Survival rate of translocated SRF for each planting cohort.

Monitoring Year (1 – 8)	Survival Rate (Alive/No. translocated)		
Cohort (Year)	**2014 (#/23)**	**2015 (#/32)**	**2017 (#/3)**
1	17	32	NA
2	17	20	NA
3	17	18	3
4	15	15	3
Mid-5	-	13	1
5	15	13	1
Mid-6	15	12	1
6	14	11	1
7	8	7	1
8	5	9	0

Both the Year 6 and Year 7 annual reports identified that the number of SRF plants had fallen below the 50% survivorship threshold, triggering a contingency response. Contingency measures for SRF are outlined in the CMP, Section 8.9 (EHP 2014a). In this case, supplementary planting and biomass reduction was required. Consequently, seed collected in 2020 was germinated and maintained by Victoria University until May 2022. As outlined in the Year 7 annual report, 28 SRF seedlings were to be planted in 2021, however due to Covid-19 and subsequent lockdowns in Victoria, no planting was undertaken. Additionally, an ecological burn was undertaken to remove biomass and promote SRF regrowth (see Section 3.1.4).

The overarching threats to the translocated and remnant SRF within the offset site continues to be biomass, weeds, drought and translocation stress. In Year 8, water pooling provided sub-optimal conditions for translocated SRF and several remnant SRF (Figure 4a). The area affected by prolonged water pooling included the recipient site for translocated SRF (Plate 31). Given that the overall health and survivorship of translocated plants was declining prior to Year 8, it is unlikely that the prolonged water pooling contributed significantly to the number of plants considered dead (i.e. no above ground biomass observed) at the end of Year 8. However, to prevent further losses due to inundation, seedlings collected from Victoria University were planted outside the area affected by water (Figure 4a – 4c) (Plate 33; Plate 34) as part of the contingency measures invoked by the low survivorship (Section 4.1.1).

4.1.1. Contingency Measures

The 2022 recipient site is located within the south-eastern corner of the offset site (Figure 2). Suitability of this area was considered prior to planting; the area identified in Figure 4c supports similar environmental variables and management, and contains healthy remnant SRF population, ensuring that the location is suitable for translocation. This area is slightly higher in elevation than the previous SRF recipient site, ensuring that water pooling will not be problematic, however additional watering to ensure survivorship may be required.

Twenty-two (22) SRF seedlings grown from previously collected seed from specimens within the offset site were collected from VicUni and planted within the offset site by AES on the 27 May 2022. All plants were planted, lightly mulched, guarded and tagged (Plate 35). Follow up watering will occur as required.

Monitoring of the seedlings will occur in Year 9, as per the requirements detailed in the CMP (EHP 2014a) and be detailed in subsequent Annual Reports. Aus Eco Solutions continue to monitor and manage the seedlings.

Collection of additional seed material will occur throughout Year 9 as part of the monitoring and management of the population.

Plate 33. Previous SRF recipient site affected by water pooling; looking west from the eastern boundary (Ecology and Heritage Partners 17/03/2022).

Plate 34. Translocated SRF recipient site (2022) and planted SRF seedlings (Aus Eco Solutions 27/05/2022).

Plate 35. Spiny Rice-flower seedling ready for planting into the offset site (Ecology and Heritage Partners 17/03/2022).

Remnant SRF within the offset site were observed as being in moderate to good condition throughout Year 8 (Plate 36; Plate 37). Further, remnant SRF appeared unaffected (some minor leaf yellowing indicating stress) by the water pooling event (Plate 38 – Plate 41), however, plants will continue to be monitored to ensure ongoing survivorship.

Plate 36. Healthy Remnant SRF in PG3 (Ecology and Heritage Partners 17/03/2022).

Plate 37. Healthy remnant SRF with good foliage cover (Ecology and Heritage Partners 17/03/2022).

Plate 38. Remnant SRF within the water affected area with leaf yellowing (Ecology and Heritage Partners 7/12/2022).

Plate 39. Healthy remnant SRF within the water affected area, surrounded by senescing Kangaroo Grass (Ecology and Heritage Partners 17/03/2022).

Plate 40. Remnant SRF recently hand weeded within water affected area (Ecology and Heritage Partners 17/03/2022).

Plate 41. Remnant SRF within the water affected area, surrounded by healthy and senescing Kangaroo Grass (Ecology and Heritage Partners 17/03/2022).

4.1.2. Required Management Actions

High threat weeds such as Patterson's Curse, Toowoomba Canary-grass, Slender Pigeon-grass, and native grasses including Kangaroo Grass have the potential to out-compete or smother translocated SRF plants and prevent recruitment. However, ongoing weed control, including hand weeding, and biomass removal and implementation of the watering regime are anticipated to continue to mitigate these threats.

As per the contingency measures detailed in the CMP (EHP 2014a), seed will be collected by AES from SRF within the offset site following the 2022 flowering season. SRF seeds will be cleaned and given to VicUni in 2022 for germination. Seedlings will then be planted into the offset site, as required. The translocation of SRF in the offset site is considered successful when 50% of translocated SRF have survived for a period of 5 consecutive years, as per the CMP. The 2014 cohort has reached this target.

3.3 Striped Legless Lizard Monitoring

Striped Legless Lizard monitoring was undertaken on the 1 and 17 November, and 2,10, 17, and 22 December 2021 by qualified Ecologists. A total of two SLL individuals were recorded within the study area during the Year 8 targeted surveys, however, these individuals were not able to be captured (Table 7). Eastern Blue-tongue *Tiliqua scincoides,* Tiger Snake *Notechis scutatus* (Plate 42) and Little Whip Snake *Suta flagellum* were also recorded in the study area during tile grid checks. No other vertebrate fauna species of note were recorded during targeted surveys.

This result is in contrast to the most recent monitoring survey results, in which Year 7 recorded 12 SLL individuals, Years 5 and 6 recorded 19 individuals, Year 4 recorded 18 individuals, and Year 3 recorded a total of 14 individuals. In Years 1 and 2 of the monitoring program, no more than three individuals were observed. It is possible that some of the individuals recorded during past monitoring surveys were recaptures. In addition, the presence of a potential predator species, a Tiger Snake (Plate 40), was observed in Grid 1 (Figure 3) during three of the six tile checks while being previously absent during past monitoring seasons. This may have discouraged SLL from seeking shelter under nearby tiles.

Plate 42. Grid 1– Tiger Snake (Ecology and Heritage Partners 15/12/2022).

Table 7. Summary of Striped Legless Lizard surveys.

Date	Observer	Time	Air Temp	Cloud Cover (%)	Wind Direction and Speed	Above Tile Temp	Under Tile Temp	Grid 1 (east)	Grid 2 (west)
01/11/21	LM	11.05	24	15	S (17km)	37.6	26.8	1 x TS	-
17/11/21	SL/LP	1:30	17	50	S (13km)	-	-	-	-
02/12/21	SP	10:56	31.3	10	NE (13.0 km)	61.6	37.5	1 x TS	1 x LWS
10/12/21	SP	12:07	17.1	70	S (29.6 km)	42.5	24.5	**2 x SLL**	1 x EBT
15/12/21	SP	12:29	16.8	50	SE (11.1 km)	-	-	1 x TS	1 x LWS
20/12/21	SP	11:01	19.6	0	W (22.2 km)	48.0	33.0	-	-

Note: SLL = Striped Legless Lizard; EBT = Eastern Blue-tongue, LWS = Little Whip Snake, TS = Tiger Snake. Blank readings were the result of equipment malfunction.

4.1.3. Habitat monitoring results

The CMP details the requirements for SLL habitat rehabilitation and management. For each habitat variable, the recorded value must be compared to the trigger value to determine if a management response is triggered, and the nature of the response required. Section 2.3 (Table 4) summarises the monitoring categories and trigger thresholds for SLL monitoring, while Table 8 summarises the results of Year 8 habitat monitoring. Three trigger values were exceeded, being the cover of introduced grass, the amount of exposed rock, and inter-tussock spacing (Plate 43 – 50).

Plate 43. Grid 1; looking south from the north-western corner (Ecology and Heritage Partners 7/12/2021).

Plate 44. Grid 1; looking north-east from the south-western corner (Ecology and Heritage Partners 7/12/2021).

Plate 45. Grid 1; looking north-west from the south-eastern corner (Ecology and Heritage Partners 7/12/2021).

Plate 46. Grid 1; looking south-west from the north-eastern corner (Ecology and Heritage Partners 7/12/2021).

Plate 47. Grid 2; looking south from the north-eastern corner (Ecology and Heritage Partners 7/12/2021).

Plate 48. Grid 2; looking south-east from the north-western corner (Ecology and Heritage Partners 7/12/2021).

Plate 49. Grid 2; looking north-east from the south-western corners (Ecology and Heritage Partners 7/12/2021).

Plate 50. Grid 2; looking north from the south-eastern corner (Ecology and Heritage Partners 7/12/2021).

Table 8. Striped Legless Lizard habitat monitoring results.

Habitat Variable	Grid 1 (East)					Grid 2 (West)					Response Triggered
	Q 1	Q 2	Q 3	Q 4	Average (%)	Q 1	Q 2	Q 3	Q 4	Average (%)	
Native clumping grass (%)	40	50	85	55	**57.5**	40	40	70	50	**50**	No
Introduced grass (%)	30	20	10	20	**20**	40	40	10	20	**27.5**	**Yes**
Bare ground (%)	5	5	5	5	**5**	5	5	5	5	**5**	No
Exposed rock (%)	15	10	1	1	**6.75**	5	5	1	3	**3.5**	**Yes**
Inter-tussock spacing (cm)	5	5	5	3	**4.5**	5	5	3	3	**4**	**Yes**

Note: Q1 and Q2 results are from Year 7 monitoring report (July – December) (Ecology and Heritage Partners 2021). Q3 and Q4 are from the current, Year 8, monitoring period.

4.1.4. Required Management Actions

A population of SLL is still present in the offset site, with the species being recorded during one of the six tile grid checks.

Monitoring indicated that the quality of SLL habitat in the offset site has declined slightly during the Year 8 monitoring season compared to the past Year 6 and 7 levels, triggering responses for three management actions, including:

- Introduced grass cover >20%;
- Exposed rock <5%; and,
- Inter-tussock spacing <10% (see Table 4 for monitoring criteria).

Grid 2 requires management actions for high levels of introduced grass cover (which has increased in cover since the ecological burn event in June 2019 to >20%), lower than ideal levels of exposed rock (<5%), and lower than ideal inter-tussock spacing (<10 cm). The eastern grid requires one management action, having lower than ideal levels of inter-tussock spacing (<10 cm). The management responses for these habitat variables are to remove weeds or vegetation.

As discussed in Section 3.1.4, an ecological burn was planned for PG2 (Grid 2) in Year 8, however contingency measures were required to be implemented in the western half of the offset site due to water inundation resulting in grassland dieback (Figure 2; Figure 3). As a result, no works were undertaken in Grid 2 in Year 8, despite the required management triggers. Works to improve SLL habitat in Grid 2 will be undertaken in Year 9, including:

- Ecological burn;
- Targeted weed control; and,
- Brush cutting and/or direct plant removal to reduce biomass and improve inter-tussock spacing (where appropriate).

The effect of the ecological burn on the suitability of SLL habitat within Grid 1 will continue to be monitored throughout Year 9.

3.4 OMP Management Actions

The following section relates to the management actions and targets summarised in Table 12 of the OMP prepared for the offset site (EHP 2014b).

Table 9. Assessment of completed/required actions in Year 9.

Year	Action No.	Land use and management actions to be completed	Resource/personnel required	Timing of action	Key performance target	Action completed (Y/N)	Action required in Year 9
8	**Year 8**						
8	8.1	Undertake control of woody weeds (Table 9 of OMP).	Bushland Mgt Contractor/PTV.	Before seed heads mature in spring/summer.	Ensure cover of woody weeds is <1%.	Y	Continue to remove germinating woody weeds and cut & paint re-sprouting plants.
8	8.2	Undertake control of exotic grasses and herbaceous broadleaves (See Table 9). Three visits per year.	Bushland Mgt Contractor/PTV.	Before seed heads mature in spring/summer	Reduce perennial grass cover to <40% and annual grasses/broadleaves to <5%	Y	Perennial grass cover has been reduced to <40%, however annual grasses continue to persist above 5%. Undertake ecological burn in Year 9 to reduce annual weeds. Continue to brush cut and spot spray annual weeds.
8	8.3	Conduct rabbit control if required.	Pest Mgt Contractor/PTV	After peak breeding season - late summer/early autumn.	Significant reduction in number/signs of rabbits.	Y	Continue to monitor for evidence of pest animals and undertake pest animal control, if required.
8	8.4	Maintain Perimeter Fence	PTV	Ongoing	Fence is maintained and fixed if broken	Y	Continue to monitor perimeter fence and undertake repairs, if required.
8	8.5	Undertake biomass reduction either	Bushland Mgt Contractor/PTV.	Autumn	Areas of inter-tussock space opened up to allow recruitment	Y	An ecological burn was undertaken in the eastern section of the offset site. An

Year	Action No.	Land use and management actions to be completed	Resource/personnel required	Timing of action	Key performance target	Action completed (Y/N)	Action required in Year 9
		weeding/mosaic burns in selected areas					ecological burn will be undertaken in the western section in Year 9.
8	8.6	Monitor status of vegetation condition, and the status of Spiny Rice-flower and Striped Legless Lizard populations and the condition of their habitat within the offset site and provide annual report to DEPI/DoE.	PTV/ Qualified Ecologist	Early Summer	Progress report to satisfaction of DEPI/DoE	Y	Continue to monitor the quality of vegetation and suitability of habitat for SLL, particularly in areas subject to prolonged water inundation.
8	8.7	Removal of all existing rubbish from site and rubbish removed immediately if further dumping occurs.	PTV/Contractor	At least every 2 months	All rubbished removed and removed immediately if dumping occurs.	Y	Rubbish is typically windblown rubbish that enters the offset site from the adjacent train station platform and surrounding industrial development. AES regularly remove rubbish from the offset site and will continue to remove rubbish in Year 9.

4 CONCLUSION AND RECOMENDATIONS

Year 8 monitoring indicated that the overall quality of native vegetation (outside areas subject to water inundation) is improving, however ongoing management and monitoring is required to ensure that the offset site maintains optimal habitats for significant species, such as SRF and SLL.

As outlined throughout the report, biomass from native (Kangaroo Grass) and introduced vegetation is high and ongoing works are required to reduce this. An ecological burn is planned for PG2 in Autumn, Year 9. This will reduce biomass, open up inter-tussock space and assist in controlling weeds, particularly grassy weeds.

Year 8 monitoring indicated a reduction in the number of SLL within the offset site. As discussed in Section 3.3, Grid 1 was located in the area subject to inundation, and a Tiger Snake was recorded several times in Grid 1. The combination of high biomass, low inter-tussock space, water inundation and the predatory snake may have resulted in low captures in Year 8.

An ecological burn planned for the middle section of the offset site in Autumn 2023 will also improve the overall quality and suitability of habitat for SLL. Therefore, SLL habitat improvement works should be ongoing; Year 9 monitoring will determine whether the population of SLL are still present within the offset site.

As highlighted in previous monitoring reports, survivorship of translocated SRF are declining within the offset site. To remediate this, twenty-two SRF seedlings were planted into the offset site in May 2022, with the seedlings placed outside of the area affected by the water pooling.

As per the contingency measures, additional seed will be collected by AES and germinated by VicUni in 2022, with seedlings planted into the offset site in 2023, if they have reached suitable planting size. Monitoring has indicated that remnant SRF are unaffected by the water pooling, however steps have been undertaken to ensure this does not become a recurring issue within the offset site. To determine the overall survival rates of translocated and remnant SRF, Year 8 monitoring will be undertaken once plants begin to re-sprout following the ecological burn. Results of this assessment may be presented in an addendum to this Year 8 annual report, or within the Year 9 annual report.

Weed control throughout Year 8 has been effective at reducing the overall cover of weeds throughout the offset site, however, works should continue to reduce the overall cover of high threat weeds and annual grasses to below the accepted thresholds (see Section 3.1.2). Additionally, works should focus on preventing high threat weeds from setting seed, however, it is acknowledged that pressure from windblown seed is a factor in reducing the overall cover of weeds within the offset site. The ecological burn in Year 8, and planned burn in Year 9, as well as targeted weed management will likely contribute to a reduction in the overall weed cover in Year 9, thus improving vegetation quality and habitat for significant species.

To ensure that the native vegetation and habitat for significant species continues to improve, the following works should be incorporated into Year 9 land management and monitoring:

- Undertake an ecological burn in the middle section (PG2) of the offset site to improve habitat suitability for SLL, control weeds, and improve the quality and extent of native vegetation;
- Monitor the recovery of native vegetation in the eastern section of the offset site (i.e. in areas subject to water inundation). Undertake additional planting/seed broadcasting, if required;
- Monitor Vline drains and associated infrastructure to ensure prolonged water pooling does not occur in Year 9;
- Collect and germinate SRF seed (2022), and plant seedlings into offset site in mid-2023 (pending seedling growth and suitability for translocation);
- Continue to monitor and manage (i.e. water and hand weed) translocated and remnant SRF;
- Undertake targeted weed control to meet the targets outlined in the OMP (see Table 5);

- Continue to monitor rabbit proof fences for breaches and damage, including fallen/removed offset signage; and,
- Undertake rabbit control, if required.

REFERENCES

Aus Eco Solutions (2022). *Draft A2256 – VicTrack – Caroline Springs Grassland – 2022- Management Report*. Aus Eco Solutions, Ballan, Victoria.

Ecology and Heritage Partners Pty Ltd. 2014a. *Conservation Management Plan for the proposed Caroline Springs Railway Station, Victoria*. Unpublished report prepared by Ecology and Heritage Partners Pty Ltd on behalf of Public Transport Victoria.

Ecology and Heritage Partners Pty Ltd. 2014b. *Offset Management Plan for the proposed Caroline Springs Railway Station, Victoria.* Unpublished report prepared by Ecology and Heritage Partners Pty Ltd on behalf of Public Transport Victoria.

Ecology and Heritage Partners Pty Ltd 2015. *Annual Report for the Caroline Springs Railway Station Grassland – Year 1.* Report prepared for Public Transport Victoria. July 2015.

Ecology and Heritage Partners Pty Ltd 2016. *Annual Report for the Caroline Springs Railway Station Grassland – Year 2.* Report prepared for Public Transport Victoria. August 2016.

Ecology and Heritage Partners Pty Ltd 2018a. *Annual Report for the Caroline Springs Railway Station Grassland – Year 4.* Report prepared for Public Transport Victoria. August 2018

Ecology and Heritage Partners Pty Ltd 2018b. *Mid-Year Report for the Caroline Springs Railway Station Grassland – Year 5 (July – December 2018).* Report prepared for Public Transport Victoria. December 2018

Ecology and Heritage Partners Pty Ltd 2019. *Annual Report for the Caroline Springs Railway Station Grassland – Year 5 (Jan – June 2019).* Report prepared for Public Transport Victoria. August 2019.

Ecology and Heritage Partners Pty Ltd 2020. *Mid-Year Report for the Caroline Springs Railway Station Grassland – Year 6 (July – December 2019).* Report prepared for Public Transport Victoria. March 2020.

Ecology and Heritage Partners 2021. *Annual Report for the Caroline Springs Railway Station Grassland – Year 7.* Prepared for VicTrack. July 2021.

PSRT 2013. Translocation Protocol (March 2013) [Online]. Melbourne: Pimelea spinescens Recovery Team. Available: http://bird.net.au/bird/images/4/4b/Pimelea_spinescens_Translocation_Protocol_March_2013.pdf [01/04/2014].

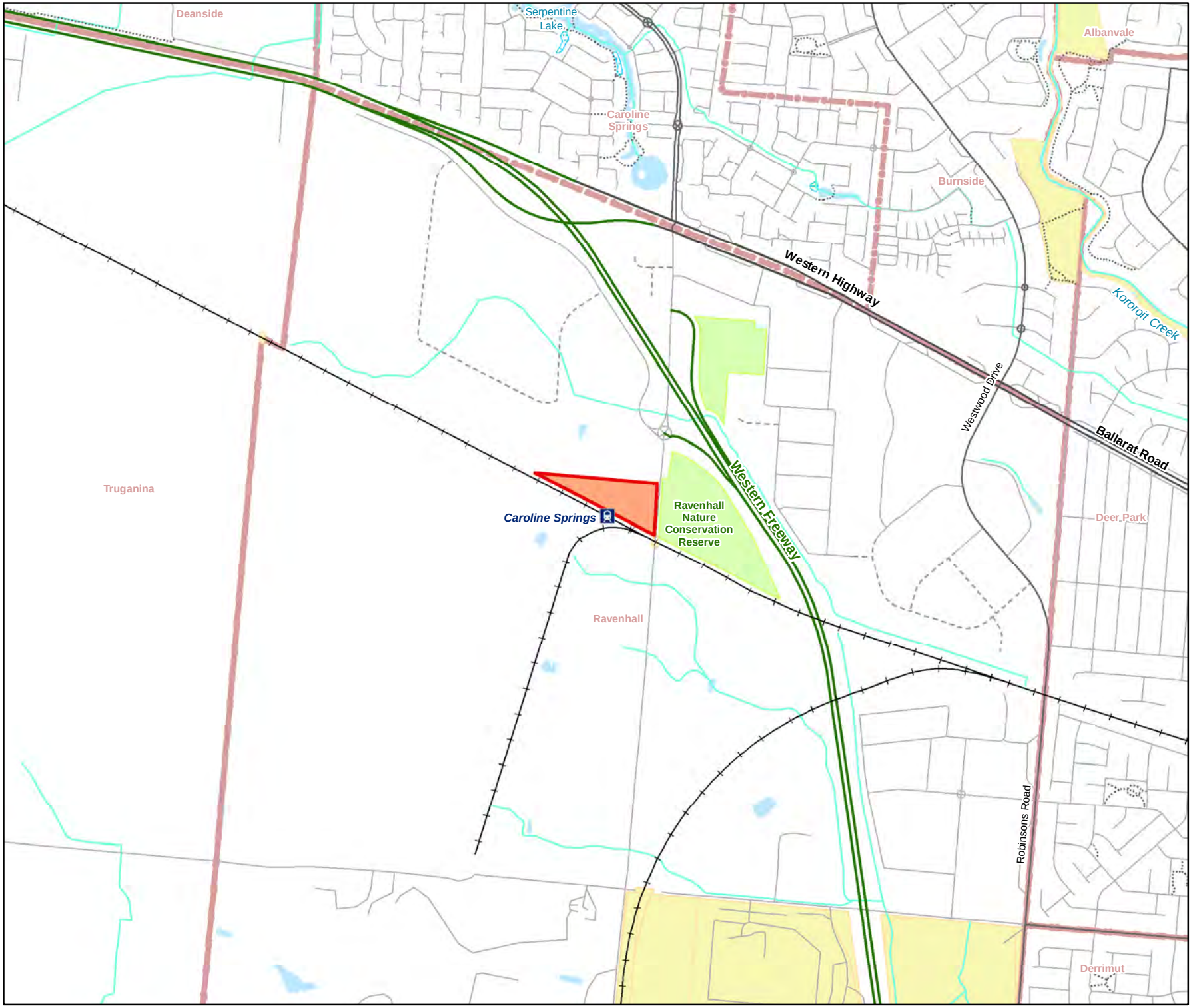
SEWPaC 2010. *Approval: Caroline Springs Railway Station Development, Ravenhall, Victoria (EPBC 2010/5463).* Approval decision by the Department of Sustainability, Environment, Water, Population and Communities, Canberra, ACT.

SEWPaC 2011. *Variation to Condition Attached to Approval: Caroline Springs Railway Station Development, Ravenhall, Victoria (EPBC 2010/5463).* Variation of condition of approval by the Department of Sustainability, Environment, Water, Population and Communities, Canberra, ACT.

Threatened Species Scientific Committee 2008. *Commonwealth Listing Advice on Natural Temperate Grassland of the Victorian Volcanic Plain*. Department of the Environment, Water, Heritage and the Arts. Available from: https://bit.ly/3bnW7n6. In effect under the EPBC Act from 21-Jun-2008.

Vallee, L., Hogbin, T., Monks, L., Makinson, B., Matthes, M. & Rossetto, M. 2009. *Guidelines for the translocation of threatened plants in Australia.* Second edition. Australian Network for Plant Conservation, Canberra.

FIGURES



Legend

- Study Area
- Railway
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities

Figure 1

Location of the study area

Caroline Springs
Year 7 Annual Report

N

0 250 500
Metres

ecology & heritage partners

14160_fr13379_Fig01_StudyArea 7/06/2021 psorensen

Legend

- Lot boundary
- Offset site
- Spiny Rice-flower recipient site (2022)
- Spiny Rice-flower recipient site (previous)
- Herb plantings
- Rubbish pile
- Plains Grassland / Retained areas of NTGVVP
- Plains Grassy Wetland
- PG1/NTGVVP impacted by water inundation
- Plains Grassland / Removed areas of NTGVVP and Striped Legless Lizard habitat
- Ecological burn 2022
- Rockpile

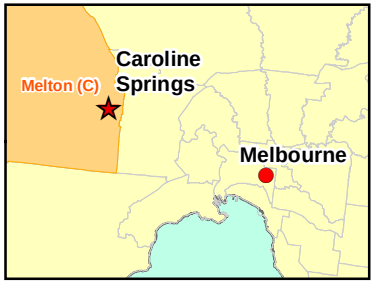


Figure 2

Ecological features and extent of NTGVVP and Striped Legless Lizard habitat

Caroline Springs Year 8 Annual Report

N

0 20 40

Metres

ecology & heritage partners

15499_Fig02_EcoFeat_NTGVVP_SLL 4/07/2022 Melsley

Aerial source: Nearmap 2022

Legend

- Study Area
- Tile grids

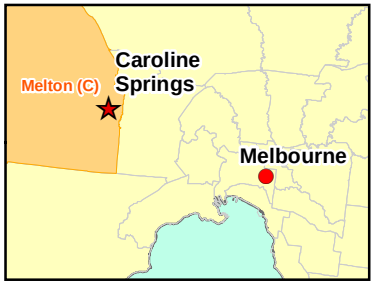


Figure 3

Striped Legless Lizard grid locations and records

Caroline Springs

Year 8 Annual Report

N

0 25 50

Metres

ecology & heritage partners

15499_Fig03_SLL_GridLoc 4/07/2022 Melsley

Aerial source: Nearmap 2022

Legend

- Spiny Rice-flower recipient site (2022)
- Spiny Rice-flower recipient site (previous)
- Translocated Spiny Rice-flower (2022)
- Monitored *In-situ* Spiny Rice-flower
- Translocated Spiny Rice-flower (2017)
- Translocated Spiny Rice-flower (2015)
- *In-situ* Spiny Rice-flower population (August 2014)
- *In-situ* Spiny Rice-flower population (August 2015)
- Translocated Spiny Rice-flower (2014)
- Offset site
- Study Area
- Retained areas of Grassland
- Retained areas of Grassland impacted by water inundation
- Ecological burn 2022

Figure 4a

Spiny Rice-flower recipient site, and monitored and translocated Spiny Rice-flowers

Caroline Springs
Year 8 Annual Report

N

0 25 50
Metres

ecology & heritage partners

15499_Fig04a_SRF_RecipientSite 14/06/2022 psorensen

Aerial source: Nearmap 2022

Legend

- Spiny Rice-flower recipient site (previous)
- Monitored *In-situ* Spiny Rice-flower
- Translocated Spiny Rice-flower (2017)
- Translocated Spiny Rice-flower (2015)
- Translocated Spiny Rice-flower (2014)
- Offset site

Figure 4b

Spiny Rice-flower recipient site, and monitored and translocated Spiny Rice-flowers

Caroline Springs

Year 8 Annual Report

N

0 3 6

Metres

ecology & heritage partners

15499_Fig04_SRF_RecipientSite_MB 14/06/2022 psorensen

Aerial source: Nearmap 2022

Legend

- Spiny Rice-flower recipient site (2022)
- Translocated Spiny Rice-flower (2022)
- Offset site

Figure 4c

Spiny Rice-flower recipient site, and monitored and translocated Spiny Rice-flowers

Caroline Springs

Year 8 Annual Report

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Metres

ecology & heritage partners

15499_Fig04_SRF_RecipientSite_MB 14/06/2022 psorensen

Aerial source: Nearmap 2022

Legend

- Photo points
- Ecological burn 2022
- Ecological burn 2019
- Ecological burn 2018
- Offset site
- Spiny Rice-flower recipient site (2022)
- Spiny Rice-flower recipient site (previous)
- Herb plantings

Figure 5

Location of photo points and ecological burn

Caroline Springs
Year 8 Annual Report

N

0 15 30
Metres

ecology & heritage partners

15499_Fig05_Photopoints_Ecoburn 14/06/2022 psorensen

Aerial source: Nearmap 2022

APPENDICES

Appendix 1. Habitat Hectare Assessment

Table A1.1. Habitat hectare assessment.

Vegetation Zone		PG1	PG2	PG3	PGWe1
Bioregion		Victorian Volcanic Plain			
EVC / Tree		Plains Grassland (Heavier Soils)			Plains Grassy Wetland
EVC Number		132_61			125
EVC Conservation Status		Endangered			
Patch Condition	Large Old Trees /10	Na			
	Canopy Cover /5	Na			
	Under storey /25	15	20	10	5
	Lack of Weeds /15	7	7	4	4
	Recruitment /10	0	0	0	0
	Organic Matter /5	3	3	4	2
	Logs /5	Na			
	Treeless EVC Multiplier	1.36			
	Subtotal =	34	40.8	18	14.96
Landscape Value /25		16			
Habitat Points /100		50	56.8	24.48	30.96
Habitat Score		0.50	0.57	0.24	0.31

Appendix 2. Spiny Rice-flower Monitoring Data

A2.1. 2014/2015 Transplant Cohort

Table A2.1. Sex and status of translocated Spiny Rice-flower.

Plant #	Sex	Plant Status	Flowering & per cent in flower	% Foliage	Heath score (1-5)	Germinants
#1	Female	**Dead**	-	-	-	-
#2	Male	**Dead**	-	-	-	-
#3	Female	**Dead**	-	-	-	-
#4	Female	Alive	0	3	5	0
#5	Female	**Dead**	-	-	-	-
#6	Female	Alive	0	80	1	0
#7	Female	**Dead**	-	-	-	-
#8	Female	**Dead**	-	-	-	-
#9	Female	**Dead**	-	-	-	-
#10	Male	Alive	0	90	1	0
#11	Male	Alive	0	70	2	0
#12	Male	**Dead**	-	-	-	-
#13	Female	**Dead**	-	-	-	-
#14	Female	Alive	0	50	3	0
#15	Male	**Dead**	-	-	-	-
#16	Male	**Dead**	-	-	-	-
#17	Male	**Dead**	-	-	-	-
#18	Female	**Dead**	-	-	-	-
#19	Male	**Dead**	-	-	-	-
#20	Male	**Dead**	-	-	-	-
#21	Female	**Dead**	-	-	-	-
#22	Female	**Dead**	-	-	-	-
#23	Male	**Dead**	-	-	-	-

A2.2. 2015/2016 Transplant Cohort

Table A2.2. Sex and status of translocated Spiny Rice-flower.

Plant #	Sex	Plant Status	% flowering	% Foliage	Heath score (1-5)	Germinants
#24	Male	Alive	0	50	3	0
#25	Male	Alive	0	60	2	0
#26	Female	**Dead**	-	-	-	-
#27	Female	Alive	0	70	1	0
#28	Male	Alive	0	20	4	0
#29	Female	**Dead**	-	-	-	-
#30	Male	**Dead**	-	-	-	-
#31	Male	**Dead**	-	-	-	-
#32	Female	**Dead**	-	-	-	-
#33	Male	**Dead**	-	-	-	-
#34	Male	**Dead**	-	-	-	-
#35	Female	**Dead**	-	-	-	-
#36	Male	**Dead**	-	-	-	-
#37	Female	Alive	0	55	2	0
#38	Male	**Dead**	-	-	-	-
#39	Female	**Dead**	-	-	-	-
#40	Male	Alive	0	55	4	0
#41	Male	**Dead**	-	-	-	-
#42	Female	**Dead**	-	-	-	-
#43	Male	**Dead**	-	-	-	-
#44	Female	**Dead**	-	-	-	-
#45	Male	Alive	0	70	2	0
#46	Female	Alive	0	90	1	0
#47	Female	Alive	0	75	2	0
#48	Male	**Dead**	-	-	-	-
#49	Male	**Dead**	-	-	-	-
#50	Male	**Dead**	-	-	-	-
#51	Male	**Dead**	-	-	-	-
#52	Female	**Dead**	-	-	-	-
#53	Female	**Dead**	-	-	-	-
#54	Female	**Dead**	-	-	-	-
#55	Female	**Dead**	-	-	-	-

Appendix 3. Translocated Spiny Rice-Flower photos

Plate A4.1. Transplant 1 (Dead)

Plate A4.2. Transplant 2 (Dead)

Plate A4.3. Transplant 3 (Dead)

Plate A4.4. Transplant 4 (Alive)

Plate A4.5. Transplant 5 (Dead)

Plate A4.6. Transplant 6 (Alive)

Plate A4.7. Transplant 7 (Dead)

Plate A4.8. Transplant 8 (Dead)

Plate A4.9. Transplant 9 (dead)

Plate A4.10. Transplant 10 (Alive)

Plate A4.11. Transplant 11 (Alive)

Plate A4.12. Transplant 12 (Dead)

Plate A4.13. Transplant 13 (Dead)

Plate A4.14. Transplant 14 (Alive)

Plate A4.15. Transplant 15 (Dead)

Plate A4.16. Transplant 16 (Dead)

Plate A4.17. Transplant 17 (Dead)

Plate A4.18. Transplant 18 (Dead)

Plate A4.19. Transplant 19 (Dead)

Plate A4.20. Transplant 20 (Dead)

Plate A4.21. Transplant 21 (Dead)

Plate A4.22. Transplant 22 (Dead)

Plate A4.23. Transplant 23 (Dead)

Plate A4.24. Transplant 24 (Alive)

Plate A4.25. Transplant 25 (Alive)

Plate A4.26. Transplant 26 (Dead)

Plate A4.27. Transplant 27 (Alive)

Plate A4.28. Transplant 28 (Alive)

Plate A4.29. Transplant 29 (Dead)

Plate A4.30. Transplant 30 (Dead)

Plate A4.31. Transplant 31 (Dead)

Plate A4.32. Transplant 32 (Dead)

Plate A4.33. Transplant 33 (Dead)

Plate A4.34. Transplant 34 (Dead)

Plate A4.35. Transplant 35 (Dead)

Plate A4.36. Transplant 36 (Dead)

Plate A4.37. Transplant 37 (Alive)

Plate A4.38. Transplant 38 (Dead)

Plate A4.39. Transplant 39 (Dead)

Plate A4.40. Transplant 40 (Alive)

Plate A4.41. Transplant 41 (Dead)

Plate A4.42. Transplant 42 (Dead)

Plate A4.43. Transplant 43 (Dead)

Plate A4.44. Transplant 44 (Dead)

Plate A4.45. Transplant 45 (Alive)

Plate A4.46. Transplant 46 (Alive)

Plate A4.47. Transplant 47 (Alive)

Plate A4.48. Transplant 48 (Dead)

Plate A4.49. Transplant 49 (Dead)

Plate A4.50. Transplant 50 (Dead)

Plate A4.51. Transplant 51 (Dead)

Plate A4.52. Transplant 52 (Dead)

Plate A4.53. Transplant 53 (Dead)

Plate A4.54. Transplant 54 (Dead)

Plate A4.55. Transplant 55 (Dead)

Appendix 4. Photo points

Plate A2.1. Photo point 1 (December 2021)

Plate A2.2. Photo point 2 (December 2021)

Plate A2.3. Photo point 3 (December 2021)

PlateA2.4. Photo point 4 (December 2021)

Plate A2.5. Photo point 5 (December 2021)

PlateA2.6. Photo point 6 (December 2021)

PlateA2.7. Photo point 7 (December 2021)

Plate A2.8. Photo point 8 (December 2021)

Plate A2.9. Photo point 9 (December 2021)

Plate A2.10. Photo point 10 (December 2021)

Appendix 5. Draft A2256 – VicTrack – Caroline Springs Grassland – 2022- Management Report (AES 2022)

A2256 - Vic Track- Caroline Springs Grassland - 2022 - Management Report

Report for Renata Pangemanan

PREPARED BY:

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Contents

1. Introduction:

Aus Eco solutions were engaged by VicTrack to undertake the vegetation and land management works of the Caroline Springs Grassland Reserve spanning the 2021-2022 financial year.

Due to delays in the on-boarding process, which included obtaining site access permits, the on-ground management did not commence until November 2021.

1.2 Project Background:

SITE DESCRIPTION:

The Grassland is located to the west of the Caroline Springs Train Station off Christies road. The reserve harbours two protected species the critically endangered Spiny Rice-flower and the threatened Striped Legless Lizard. The reserve is classified as a Natural Temperate Grassland of the Victorian Volcanic Plains and as such, the Ecological Vegetation Class (EVC) is also deemed a critically endangered community under the EPBC Act.

Approval conditions (EPBC 2010/5463) include the protection and management of the Site in accordance with a Conservation Management Plan (CMP) and an Offset Management Plan (OMP) approved by the Commonwealth and developed by Ecology & Heritage partners. The reserve is also required to be managed under Trust for Nature's guidance.

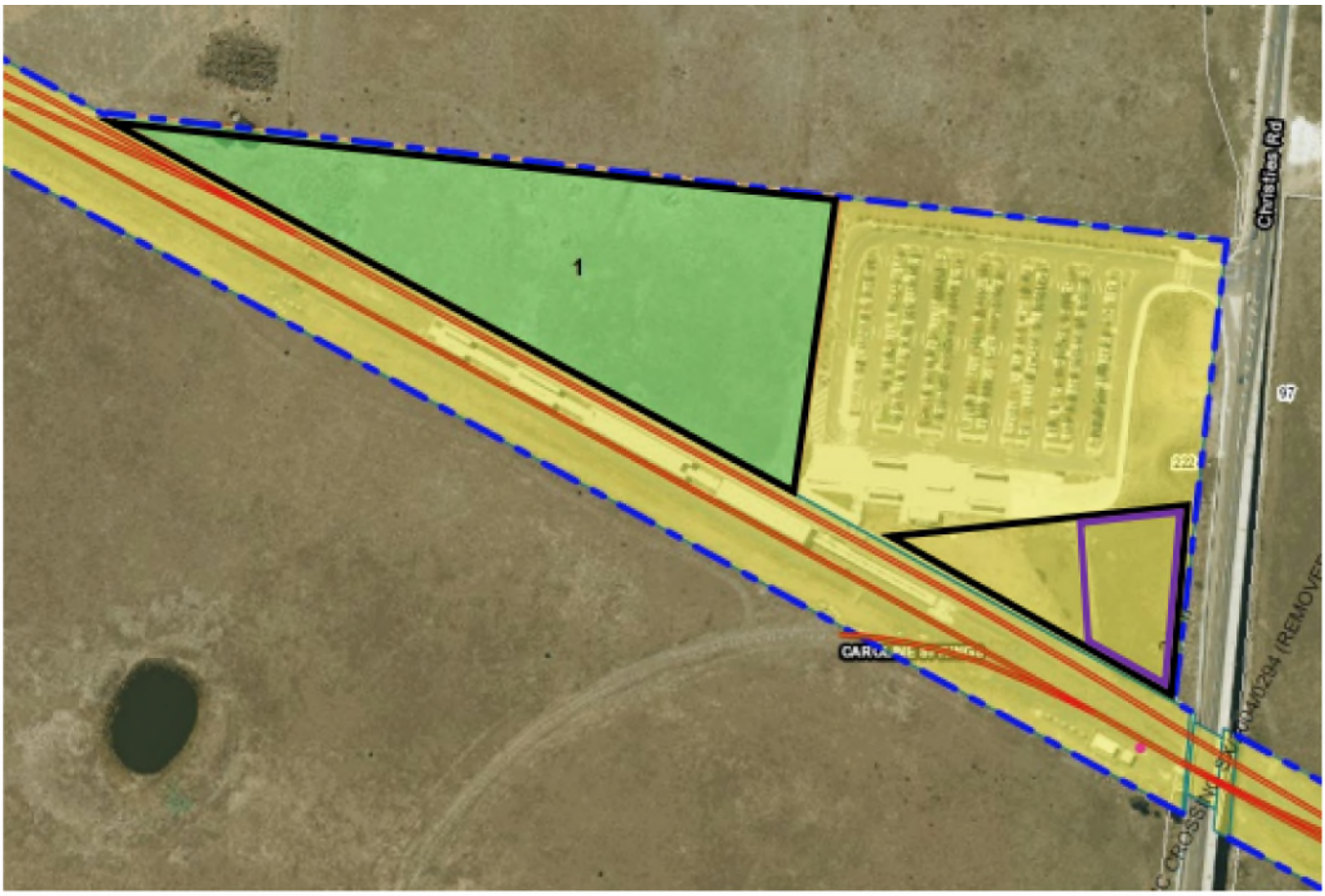
AUS ECO SOLUTIONS

Aus Eco Solutions has depots in Ballan west of Melbourne in Victoria and Wingham on the mid-north coast of New South Wales. Our family based business combines the technical knowledge of 25+ years of our founder, Kristian Guppy, with the 30+ year's experience in business systems and project management skills of his wife, Kerrie Guppy. Our business attracts a dedicated, qualified and experienced team who work with integrity and take great pride in the legacy of our work to restore native ecosystems.

Kristian holds a DELWP VIC Commercial Operators License. The Aus Eco Solutions team includes a mix of people with financial, managerial, administrative and conservation and land management qualifications and experience. Relevant qualifications include; Bachelors and Masters in Applied Science, Zoology and Environmental Management, Diplomas and Certificates II, III & IV in Conservation and Land Management, DELWP VIC Agricultural Chemical User Permits (ACUP), Chemcert, chainsaw (fallers and crosscut), pest animal management, all-terrain vehicle training, OHS training, vehicle hygiene and first aid (level 2). Our employees also have significant experience in plant identification, particularly weeds and natives to ensure off-target damage is minimised.

Aus Eco Solutions has an integrated management system framework in place that covers quality, environmental and occupational health and safety. This framework is certified to AS/ISO 9001 Quality Management Systems, AS/ISO 14001 Environmental Management Systems, AS/ISO 45000 Occupational Health and Safety Management Systems. Aus Eco Solutions is also a member of VECCI to ensure industrial relations and OHS requirements are met.

CAROLINE SPRINGS VIC TRACK SITE MAP



Legend:

VicTrack Owned Land

The land owned by VicTrack is the area bounded by a blue dashed line

Site

The site is defined by any area bound by the black line

Retained grassland (approximate area)

Leased Site:

Leased Site includes any land highlighted light pink

V/Line Site:

V/Line Leased Site includes any land highlighted light yellow

VicTrack Controlled land:

VicTrack controlled Land includes any land highlighted green, brown or red

2 . Project Objective

The objective is to monitor and manage the biodiversity within the Caroline Springs Grassland Reserve in accordance with EPBC 2010/5463 and the Commonwealth approved CMP and OMP (Year 8), between July 2021 and June 2022.

Aus Eco Solutions is a experienced and qualified team of Project Managers & Field Technicians qualified to undertake the management actions outlined in the CMP & OMP. Our team is familiar with working within Rail Reserves and native grasslands in particular. We hold the relevant qualifications in environmental management and ecological burning to deliver the technical aspects of management.

Image of a spiny rice flower re-shooting new growth post burn

image below of a large brown snake skin found onsite

3. Management Actions

The following management actions have been undertaken from November 2021 to June 2022 timeframe to assist in achieving the overall project objectives for this site.

Note:

Due to the late start of the project, two of the management actions were not achievable within the project time frame.

1. Native grass harvest.
2. Direct seeding.

Aus Eco Solutions attempted to source alternative native grass seed to sow in place of native seed not collected. However, stock availability was limited resulting in no native seeding being undertaken.

3.1 LITTER AND RUBBISH REMOVAL

Rubbish collection and removal was undertaken on a "as required" basis on each visit. As the crew undertook other management actions for the site they would collect and remove any rubbish found. The majority of the rubbish was collected from the fence line adjacent to the train station.

3.2 HERBACEOUS WEED CONTROL

The Herbaceous weed control was performed on 4 days from January to June 2022, across the site in accordance with the OMP to work towards achieving the target goals for this site. The herbaceous weeds that were treated across the site include Cape weed, Spear Thistle, Patterson's Curse, Flat weeds and Mustard weeds, Artichoke thistle seedlings were also found on-site and controlled at the same time as the other herbaceous weeds. The crews used a number of techniques to perform the Herbaceous weed control including Knapsacks with selective herbicides and hand weeding around the Spiny Rice flowers.

3.3 GRASSY WEED CONTROL

The Grassy weed control was performed on 5 days from January to June 2022, across the site in accordance with the OMP to work towards achieving the target goals for this site. The high threat weeds of this site was the main focuses of the grassy weed control to work towards the OMP targets of eliminating all high threat weeds these weeds Chilean Needle grass (*Nassella Neesiana*) and Serrated Tussock (*Nassella Trichotoma*). Grassy weed control was also performed on the following additional grassy weeds including Sweet vernal and pigeon grass (Setaria pumila) which was also identified as being on site. The crews used a number of techniques to perform the grassy weed control including Knapsacks with selective herbicides rates for grasses and hand weeding around the Spiny Rice flowers.

3.4 WOODY WEED CONTROL AND REMOVAL

The Woody weed herbicide treatment and removal for this site was performed on 2 days from January to June 2022, across the site in accordance with the OMP to work towards achieving the target goals for this site, additional ongoing monitoring for emerging woody weeds occurred across the project. The woody weeds that were controlled on the site included African boxthorn and Sweet Briar as identified in the OMP. The majority of the woody weeds were found in and around the large rock area.

The weed control methods were used in accordance with the below table to assist Vic Track in achieving below OMP target goals. Woody weeds were control using cutting and painting and Herbaceous/Grassy weeds were controlled using spot spraying, except around the Spiny Rice Flowers were hand weeding was used.

Table 1. OMP Weed Control Methods, Timing and Goals

Common Name	Control Method	Timing	Goal
Woody Weeds			
African Boxthorn	Cut and paint, remove debris from site	September – April	Eliminate (<1%)
Sweet Briar	Spot Spray/Cut and paint	September – April	Eliminate (<1%)
Herbaceous Weeds			
Cape Weed	Spot Spray	Early Spring	Eliminate (<1%)
Spear Thistle and other thistles	Spot Spray	All Year	Eliminate (<1%)
Patterson's Curse	Spot Spray	Early Spring	Eliminate (<1%)
Flat Weeds and Mustards	Spot Spray	All Year	Maintain low cover (<5%)
Soursob and other Oxalis *spp.*	Spot Spray	Later Winter at bulb exhaustion	Eliminate (<1%)
Grassy Weeds			
Chilean Needle Grass	Spot Spray	Before seed set in late spring, remove seed heads if fertile	Eliminate (<1%)
Serrated Tussock	Spot Spray	Before seed set in late spring	Eliminate (<1%)
Brown-top Bent	Spot Spray/Burn	October - January	Maintain low cover (<5%)
Annual Grasses - Various Spp.	Spot Spray/Burn	July – November	Maintain low cover (<5%)
Cocksfoot	Spot Spray	October - January	Eliminate (<1%)
Toowoomba Canary Grass	Spot Spray	October - January	Eliminate (<1%)
Caterpillar Grass	Spot Spray	October - January	Eliminate (<1%)
Couch Grass/Kikuyu	Spot Spray	November – March	Eliminate (<1%)
Panic Veldt Grass and Sweet Vernal Grass	Spot Spray	All Year	Eliminate (<1%)

Table of OMP goals for weed control

Images of weed control work performed across site including Serrated tussock , chililan needle grass, pigeon grass

3.5 PEST ANIMAL CONTROL

Pest animal activity was monitored as a part of every site visit including an inspection of the rabbit-proof fencing to ensure that the rabbit-proof fencing is maintained. Little to no pest animal activity was observed during the management period. Pest animals such as the European Rabbit and Foxes are present and have been observed in adjacent grassland reserves. Observation of any increase in pest animal activity will be reported and actioned immediately to ensure the revegetation efforts such as tube stock planting/seeding are not impacted by grazing.

It's also worth noting that a large mob of Eastern Grey Kangaroos are also present in the surrounding area and revegetation efforts will be monitored for impacts. Kangaroo deterrents may be required if grazing occurs.

3.6 RESERVE FENCE AND SIGNAGE

The small size of the reserve allows for regular perimeter inspections for damage or pest animal access points. No major damage has been reported regarding the fence to date. Signage remains clear at the main access point.

3.7 NATIVE GRASS SEED HARVEST

This management action was not undertaken due to the late project start. An alternative of purchasing native seed was explored, however, the seed stock required was not available.

3.8 BIOMASS REDUCTION (ECOLOGICAL BURN)

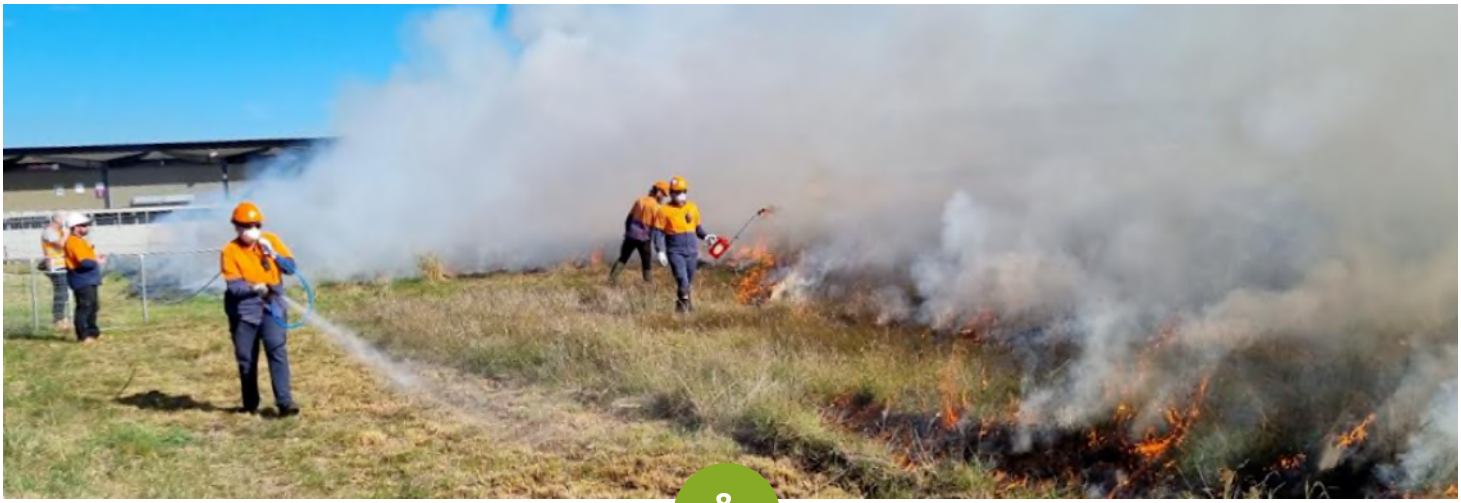
The primary objective was to burn a relatively low-lying area that was inundated with water in 2021 due to a trackside drainage issue in the eastern portion of the Reserve (.8Ha). As a result the dominant grass species, Kangaroo grass (Themeda triandra), died back. However, the grass has begun to grow back underneath a layer of dead biomass. Burning off this dead biomass at low intensity provides the native vegetation additional sunlight and an opportunity to recover.

The secondary objective was to undertake low-intensity burning that will provide sufficient heat to burn out areas of dead weedy vegetation that has been treated with herbicide. In turn, this promotes the germination of native grassland species and triggers a flush of the soil seed bank.

The burn was undertaken on the 10th of May 2022. The burn plan had been drafted, reviewed and approved in advance. Given the direct locality of the burn to the train station itself, we positioned Aus Eco Solutions and VicTrack representatives on the platform while burning.

A burn briefing was undertaken with the team prior to arriving on-site and then again once the weather conditions had been ground-truthed. Burning commenced at approximately 12:15 pm and was completed by 1:30 pm.

The burn was successful in achieving the desired results as seen in the drone picture below. Vegetation re-sprouted quickly and provided an ideal location to plant both native herbs and the Spiny Rice-flowers that had been propagated.



3.9 HERBACEOUS SEEDLING PURCHASE AND PLANTING PREPARATION

The Herbaceous seedling planting occurred on Wednesday the 18th of May. There was 500 seedlings sourced for this project that included Black-anther flax lilly (*Dianella Admixta*) 220 plants, Cottony fireweed (*Senecio Quadridentatus)* 60 Plants and Lemon Beauty-heads (*Calocephalus citreus*) 220 plants, the seedlings were sourced from the Victorian Indigenous Nursery Co-op. Additional indigenous seedlings requested from this nursery and other around the area but none has the species we were looking for. The seedlings were planted in the burnt area along the east side of the reserve a

Image of Herbaceous planting (Post fuel reduction burn)

3.10 SUPPLEMENTARY PLANTING PREPARATION

A supplementary planting occurred on Monday the 6th of June which included an additional 150 Black-anther flax lilly (*Dianella Admixta*). These seedlings were planted along the east side of the burnt area continuing on from were the first planting area ended. See below map for additional information.

3.11 SPINY RICE FLOWER (*PIMELEA SPINESCENS) SEEDLING* PLANTING

Under a separate project Aus Eco Solutions also performed a Spiny Rice Flower (*Pimelea spinescens)* seedling planting for Vic Track and Ecology heritage partners, the seedlings were propagated by Victoria University. The Spiny rice flower planting occurred on Friday the 27 of May. The area where the plants were planted was provided by Samantha Barron from Ecology & Heritage Partners, they were planted in the north corner of the burnt area. The plants were each guarded with a metal cage to protect them from insects and mice. Each plant had a metal ID tag pinned near them and was marked with a GPS for monitoring and recording.

Image of Spiny Rice Flower planted area

4 . Recommended Future Actions

4.1 ONGOING HERBACEOUS AND GRASSY WEED CONTROL

In line with the OMP ongoing Herbaceous and grassy weed control will need to be performed to continue to reduce the overall weed bio mass of the site and weed seed bank. As well as to eliminate all high threat weeds including chilean Needle grass (*Nassella Neesiana*) and Serrated Tussock (*Nassella Trichotoma*). It would be optimal to start the weed control works late winter early spring to assist in the control of weeds actively grow at those times and that can be dormant across Autumn/ Winter.

4.2 LITTER AND RUBBISH REMOVAL

Ongoing monitoring and removal of litter will also need to be performed ongoing as the site is prone to rubbish been blown in from adjacent land.

4.3 FOLLOW UP WOODY WEED CONTROL

Ongoing monitoring and control will need to be performed for any new woody weeds that will emerging from the existing seed bank to help in the elimination of the Woody weeds seed bank on this site.

4.4 WATERING OF SPINY RICE FLOWER SEEDLINGS AND HAND WEEDING

To assist the Spiny Rice Flower seedling to grow there will need to have ongoing watering to assist them to take root and grow. The plants will also need hand weeding to remove any invasive weeds from around them.

4.5 NATIVE SEED COLLECTION AND DISPERSAL

Due to issues with native seed availability Aus Eco Solutions were unable to perform a Native seed dispersal this year. It would be beneficial to site to perform a native seed dispersal next year to help increase the native seed bank for this site.

4.6 BIOMASS REDUCTION (ECOLOGICAL BURN)

A follow up burn of the Middle area of the reserve (See map below) would be beneficial in helping reduce the overall weed bio mass of the site and help promote native seed germination.

REFERENCES:

- Ecology and Heritage Partners - Offset Management Plan for the Proposed Caroline Springs Railway Station , Victoria - May 2014
- Aus Eo Solutions proposal for works - P3474 - Vic Track-Caroline Springs Grassland 2021